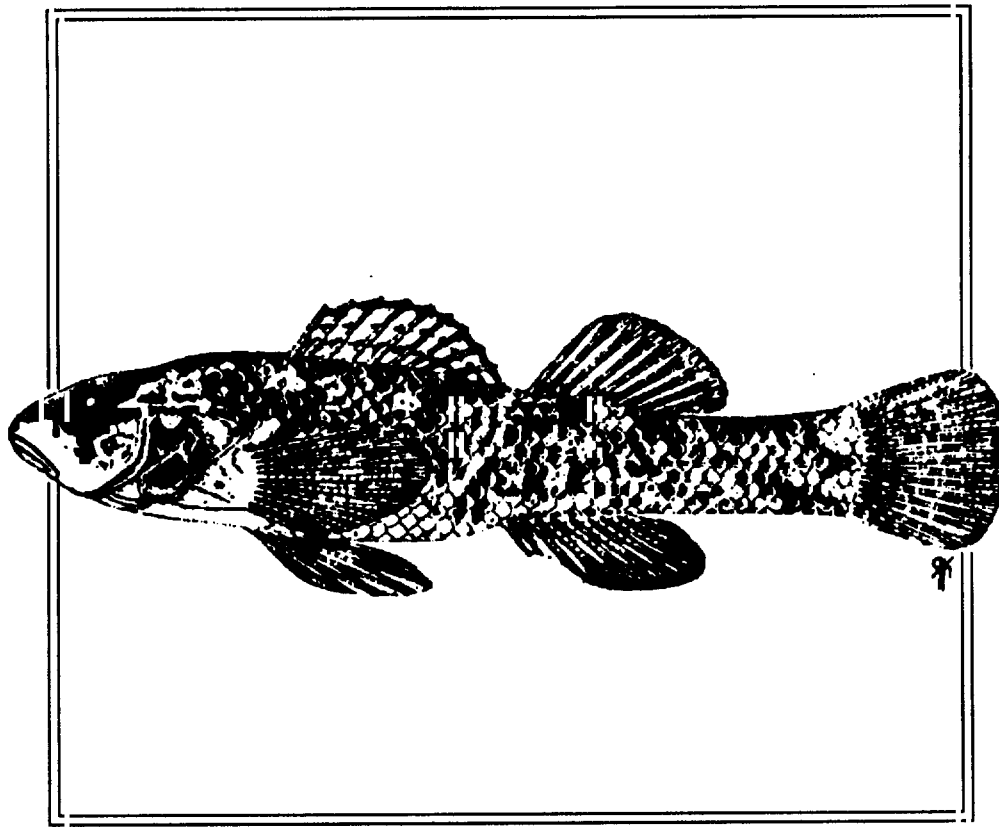


RECOVERY PLAN

Watercress Darter (*Etheostoma nuchale*)



U.S. Fish and Wildlife Service



WATERCRESS DARTER
(Etheostoma nuchale)

(Second Revision)

RECOVERY PLAN

(Original Approved: June 25, 1980)

(First Revision Approved March 27, 1984)

Prepared by Watercress Darter Recovery Team

Revised by the U.S. Fish and Wildlife Service

for

Southeast Region
U.S. Fish and Wildlife Service
Atlanta, Georgia

Approved:



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Regional Director, U.S. Fish and Wildlife Service

Date:

March 29, 1993

Recovery plans delineate reasonable actions which are believed to be required to recover and/or protect the listed species. Plans are prepared by the U.S. Fish and Wildlife Service, sometimes with the assistance of recovery teams, contractors, State agencies, and others. Objectives will only be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Recovery plans do not necessarily represent the views nor the official positions or approvals of any individuals or agencies, other than the U.S. Fish and Wildlife Service, involved in the plan formulation. They represent the official position of the U.S. Fish and Wildlife Service only after they have been signed by the Regional Director or Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species' status, and the completion of recovery tasks.

Literature citation should read as follows:

U.S. Fish and Wildlife Service. 1992. Watercress Darter (Etheostoma nuchale) Recovery Plan. Jackson, Mississippi. 16 pp.

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Fees for recovery plans vary, depending on the number of pages.

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EXECUTIVE SUMMARY

Current Status: The watercress darter is an endangered species known to occur naturally in habitat associated with three springs in Jefferson County, Alabama. The watercress darter also occurs in Tapawingo Springs, Jefferson County, Alabama, where it was successfully transplanted in January 1988. Although not conclusive, limited population survey results indicate an apparent downward trend for all of the naturally occurring populations.

Habitat Requirements and Limiting Factors: Watercress darters thrive in deeper, slow-moving backwaters of springs that are choked with aquatic vegetation such as watercress (*Nasturtium*), *Chara*, and *Spirogyra*. The very limited distribution of the watercress darter makes it highly vulnerable to threats. Indications of water quality or quantity problems have been noted at each of the sites where the watercress darter naturally occurs.

Recovery Objectives: (1) Reclassify from endangered to threatened status
(2) Delist

Recovery Criteria: The criteria for reclassification of the watercress darter from endangered status to threatened are:

- (1) long-term protection of the three known naturally occurring populations (i.e., those found in Glenn, Thomas', and Roebuck Springs);
- (2) long-term protection of at least one additional population within the historical range (i.e., the Jefferson County area); and,
- (3) five years of data indicating that a minimum of four populations are viable.

The criteria for delisting the watercress darter from threatened status are:

- (1) five years of data documenting the existence of six viable populations, each in separate discrete recharge areas; and,
- (2) long-term protection of the discrete recharge area for each viable population.

Actions Needed: Achieving the plan's objectives will require implementation of actions to determine the genetic structure of the various populations; correction of water quality and quantity problems; transplantation of watercress darters to additional sites to augment the naturally occurring populations and to protect existing genetic diversity; determination of the discrete recharge area for each viable population; and achievement of long-term protection of the recharge area and the immediate habitat from threats to each of six viable populations.

Total Estimated Cost of Recovery: The scope, duration, and cost of several of the tasks cannot be determined without further study. Therefore, the total estimated cost of recovery cannot be determined at this time.

Anticipated Date of Recovery: Unable to determine.

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PART I: INTRODUCTION

Description

In 1970, Etheostoma nuchale (watercress darter) was officially recognized as an endangered species by the U.S. Fish and Wildlife Service (1970). The watercress darter was described by Howell and Caldwell (1965). Howell recognized the darter was closely related to the gulf darter, Etheostoma swaini, but differed in details of body proportions, development of lateral line and cephalic sensory canals, certain fin-ray counts, and habitats. The watercress darter is a small, robust species growing to a maximum size of just over 5 centimeters (2 inches) in total length. Breeding males have red-orange and blue fins, and red-orange on the lower part of the body. The lateral line has 35 to 42 scales, is incomplete, and has 12 to 24 pored scales. The nape is naked.

Population Status and Distribution

The watercress darter is known to naturally occur in only three springs in Jefferson County, Alabama (Figure 1). The springs and the creeks into which they flow are all within the Black Warrior River watershed. The population at Glenn Springs (tributary of Halls Creek) was first collected in 1964. Additional field work by personnel of Samford University, Birmingham, Alabama, located two other populations: one at Thomas' Spring (also a tributary of Halls Creek), and the other at Roebuck Springs (tributary of Village Creek). The watercress darter habitat and population at Thomas' Spring has been expanded by construction of a pond below the Spring.

A new population has been established by a transplantation from Roebuck Springs on January 19, 1988, to Tapawingo Springs (tributary of Turkey Creek) in Jefferson County, Alabama. Reproduction has since occurred in the Spring, indicating that this transplant was successful.

Standardized population surveys for the watercress darter were conducted annually from 1985 through 1989 by Dr. William Mike Howell of Samford University (Howell 1989) and during 1991 by Alabama Department of Conservation and Natural Resources' Jerry L. Moss and Jay Haffner (Moss and Haffner 1991). Although not conclusive, survey results indicate a downward trend for all of the naturally occurring populations.

Habitat and Life History

Watercress darters thrive in deeper, slow-moving backwaters of springs that are choked with aquatic vegetation such as watercress (Nasturtium), Chara, and Spirogyra. Such conditions allow for large populations of aquatic insects, crustaceans, and snails which form this darter's diet (Howell and Caldwell 1965). The vegetation also plays an important role as the substrate upon which the darter lays its eggs (Stiles 1986).

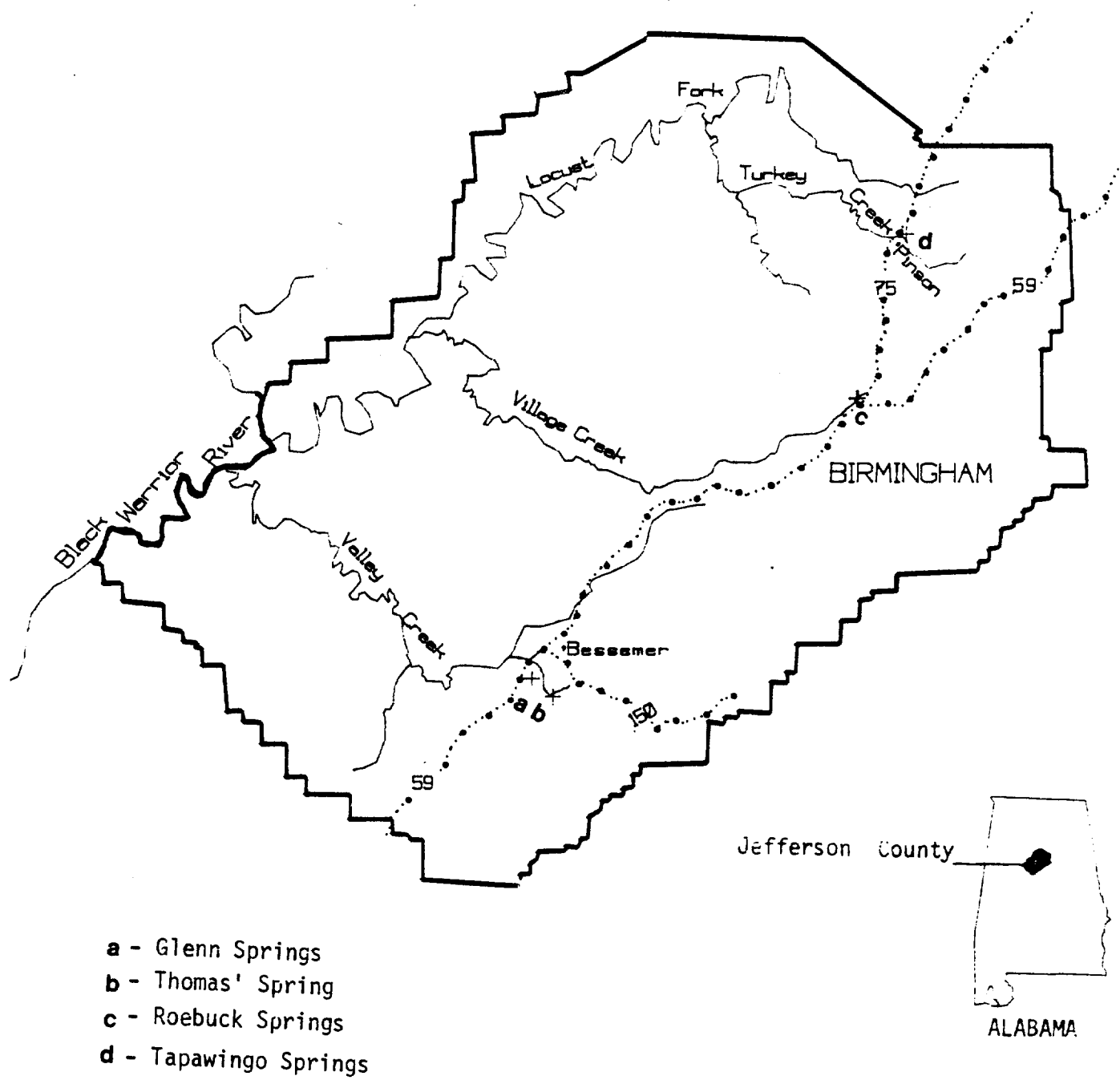


Figure 1: Sites of Known Watercress Darter Populations

Very little life history information is known about the watercress darter. Gravid females were found in collections made from March through July. The relatively constant environmental conditions under which the watercress darter is found may extend the breeding season from that of closely related species (Howell and Caldwell 1965).

Factors Affecting the Species

The very limited distribution of the watercress darter makes it highly vulnerable to threats. Factors which are most likely to limit or cause the decline of watercress darter populations are those that reduce the quantity or quality of its habitat. Following are some situations that exist in the area that are cause for concern.

The recent growth of shopping centers and apartment complexes in the Birmingham-Bessemer area has included extensive paving. Rainfall cannot continue to recharge local springs at historic levels when the water is swiftly channeled off parking lots into drains.

The quantity and quality of Glenn Springs aquatic habitat has varied considerably since the watercress darter was first discovered there in 1964 (Howell 1989). A low, rock dam was removed for several years which increased the velocity of flow, reduced the water depth, and diminished the backwater area for vegetative growth upon which the darter depends. Additionally, the quantity of water has been reduced due to withdrawals from the spring basin by a nearby resident and from the spring run by Aldridge Nursery. A potential threat to the Glenn Springs population of watercress darters is the proximity of Route 20. Expansion of the highway could damage the darter's spring habitat.

The former landowner of Thomas' Spring introduced grass carp, Ctenopharyngodon idellus, to crop the aquatic vegetation in the spring. By October 1977, the grass carp had removed most of the spring's vegetation up to the shoreline. Only a single adult female watercress darter was collected (Howell 1989).

The proximity of each of the naturally occurring watercress darter populations to highways increases the risk of lethal chemical spills.

Contamination of the habitat in Roebuck Springs basin and its run has been identified along with an alarming apparent decline in the watercress darter population at that site. Due to concern over the decline, the Fish and Wildlife Service has conducted a contaminant investigation in Roebuck Springs basin and its immediate run. Analysis of sediment and snail samples reported high levels, (up to 12.0 parts per million) of polycyclic aromatic hydrocarbons. This material is known to be highly toxic to aquatic life even at levels considerably below that found in Roebuck Springs and its run (U.S. Fish and Wildlife Service 1991).

The aquifers in the Jefferson County area are generally susceptible to contamination from the surface. Where sinkholes are present, the aquifer

may be extremely susceptible to surface contamination because there is a direct link to the aquifer (Planert and Pritchett 1989). The specific direct or discreet recharge area for each spring serving as habitat for the watercress darters is unknown. As long as the discreet recharge area remains unknown and unprotected, the risk is especially high that one or more of the springs could be contaminated.

Conservation Measures

In an attempt to establish a new population of watercress darters, R.D. Caldwell and W.M. Howell, in 1965, collected 21 nuptial males and 22 nuptial females from Glenn Springs and transplanted them into Prince Springs, a tributary to Valley Creek in Jefferson County, Alabama. Subsequent collections in Prince Springs yielded no watercress darters, however, many redfin darters, Etheostoma whipplii, were collected. The redfin darter may be a competitor of the watercress darter (Howell and Black 1976). The redfin darter is not known to exist in any of the habitat that supports watercress darter populations.

After the initial discovery of watercress darters in Glenn Springs, collections from 116 springs and spring-creeks in the Jefferson-Tuscaloosa-Shelby County areas resulted in discovery of two new populations: one at Thomas' Spring and the other at Roebuck Springs (Howell and Zeiger 1978).

In June of 1986, W.M. Howell was funded by the State of Alabama's Non-Game Wildlife Program and the U.S. Fish and Wildlife Service, to conduct necessary studies and identify additional springs for potential transplant sites for the watercress darter. His recommended transplant sites were: Tapawingo Springs, Caldwell Springs, Avondale Springs, Indian Valley Springs, Prince Springs, and Hawkins Spring (Howell, Denton, and Davenport 1986).

During January of 1988, a transplant of 200 fish each was made to Tapawingo Springs and to Avondale Springs, both in Jefferson County, Alabama (Howell 1988). Reproduction has since occurred repeatedly in Tapawingo Springs. No watercress darters have since been collected from Avondale Springs; however, it should be noted that collecting conditions are difficult at that site (Howell 1989).

Thomas' Spring and adjacent downstream habitat (2.83 hectares) (7 acres) were purchased by the U.S. Fish and Wildlife Service on October 1, 1980. The area has been designated as the Watercress Darter National Wildlife Refuge and is administered by the staff of Wheeler National Wildlife Refuge.

The grass carp were removed from Thomas' Spring by Fish and Wildlife Service biologists and the spring was revegetated with Chara, Nitella, and Spirogyra early in 1981. Soon thereafter, the transplantation of watercress darters from Glenn Springs to restock Thomas' Spring was accomplished (Howell 1985).

A new pond was constructed just below Thomas' Spring and vegetated with appropriate aquatic plants. This was done to form additional watercress darter habitat. In January 1988, Dr. W. Mike Howell transplanted 100 watercress darters from Thomas' Spring into the newly constructed pond (Howell 1988).

Strategy of Recovery

The overall strategy for recovery of the watercress darter is to determine the genetic structure of the various populations; to manage the watercress darter populations in a manner that will ensure their viability and perpetuate their genetic diversity; to identify and correct watercress darter habitat degradation problems; to determine the discrete recharge area for each viable population; and to achieve long-term protection of that recharge area and the immediate habitat from threats to each of six viable populations.

PART II: RECOVERY

A. Objective and Criteria

The objective of this plan is to first reclassify the watercress darter from endangered to threatened status and then to remove it from the list of threatened species. The criteria for reclassification of the watercress darter from endangered status to threatened are:

- (1) long-term protection of the three known naturally occurring populations (i.e., those found in Glenn, Thomas', and Roebuck Springs);
- (2) the existence and long-term protection of at least one additional population within the Black Warrior River System in the Jefferson County area; and,
- (3) five years of data indicating a minimum of four populations are viable.

The criteria for delisting the watercress darter from threatened status are:

- (1) five years of data documenting the existence of six viable populations, each in separate discrete recharge areas; and,
- (2) long-term protection of the discrete recharge area for each of the six viable populations.

These recovery criteria are preliminary and may be revised on the basis of new information.

A viable population is defined as having the reproductive capability to sustain itself in perpetuity without immigration of individuals from other populations.

Long-term protection is defined as having enough control over the geographic area in question that adverse impacts are unlikely to occur.

The estimated date for recovery completion is undetermined at this time.

B. Narrative Outline for Recovery Actions Addressing Threats

1. Monitor habitat and populations. The very limited distribution of the watercress darter makes it highly vulnerable to threats. The likelihood of its survival can be enhanced by providing for early detection of threats to occupied habitat and the populations it supports. Accordingly, those will be monitored biennially in June. This will be done in a standardized manner that provides for population trend comparisons and determination of the effectiveness

of habitat enhancement measures and the overall habitat quantity and quality trends. Additionally, each population and its habitat should be visually inspected at least once each year for early detection of potential disturbances from nearby construction or other surrounding land uses. Any adverse conditions or significant changes identified during the biennial monitoring or annual visual inspection should be documented and reported to the U.S. Fish and Wildlife Service.

2. Maintain and enhance Habitat. Watercress darters thrive in moderately deep, slow-moving backwaters of unpolluted, heavily vegetated springs and their runs. Their habitat should be maintained or enhanced to maximize its quantity and quality. Degradation of watercress darter habitat must be quickly studied and corrective actions implemented to ensure the survival of this rare species.
 - 2.1 Study habitat degradation - Any degradation discovered in occupied habitat of the watercress darter should be studied to determine the cause.
 - 2.2 Determine optimum habitat conditions - Various parameters of the best known habitat should be identified and described.
 - 2.3 Determine recharge areas and identify potential contamination - Conduct hydrological studies to determine the discrete recharge area for each spring providing habitat for watercress darters. Identify potential sources of contamination within the recharge area.
 - 2.4 Implement corrective action - Assess alternative corrective actions to eliminate or alleviate the habitat degradation threat to the species and implement the preferred action.
3. Manage watercress darter populations. Ensuring the viability of the various populations and perpetuation of their genetic diversity will be a key consideration in the management of the watercress darter. The vulnerability of the naturally occurring populations and their genetic diversity should be reduced by transplantation to additional suitable sites within their historic range.
 - 3.1 Conduct genetic and viability study - The genetic structure of each naturally occurring watercress darter population and the optimum number of individuals for a viable population should be determined for each site.
 - 3.2 Prepare for captive propagation and initiate if warranted - A pilot study should be performed to work out the techniques for captive propagation of watercress darters. Captive propagation should be initiated if necessary to perpetuate the genetic diversity of watercress darters or if sufficient

naturally reared darters are not available for transplantation to additional suitable sites.

- 3.3 Prepare transplant proposal and transplant darters - A proposal to transplant watercress darters should be prepared. Selection of watercress darters for transplantation should be done in a manner that will achieve maximum heterozygosity of the species. Darters transplanted should be from viable populations with excess individuals present. Consideration for transplantation should only be given to those sites within the darter's historical range that have been determined suitable by a survey of associate species and water quality parameters of extant populations and for which long-term protection and management arrangements can be developed. In accord with a transplantation plan approved by the Fish and Wildlife Service, transplant watercress darters. Authorization must be obtained from the Fish and Wildlife Service prior to transplanting watercress darters.
4. Obtain long-term authority to manage and protect watercress darter habitat. The Fish and Wildlife Service, or other appropriate agencies, should obtain the authority to protect watercress darter habitat and the respective recharge areas from contamination, or other adverse alterations, and to manage them for optimal productivity.
 - 4.1 Protect Glenn Springs - The owner of Glenn Springs has shown great cooperation to protect the darter. Continue to work closely with the landowner to achieve mutually agreeable means to ensure the long-term protection of the darter.
 - 4.2 Protect Roebuck Springs - A stormwater discharge constitutes a contaminant threat to Roebuck Springs and the run below it. Corrective action is needed to avoid the loss of this watercress darter habitat and the population it supports. This habitat is an extensive part of the watercress darter's entire habitat base. Additionally significant, the Roebuck Springs population represents one of only two apparently reproductively isolated gene pools of watercress darters, given that Thomas' and Tapawingo Springs were recently stocked with darters from Glenn Springs. Accordingly, loss of the Roebuck Spring's population would represent a severe decline in the overall status of the watercress darter. Roebuck Springs is owned by the State of Alabama. A Conservation Agreement should be developed between the State of Alabama and the Fish and Wildlife Service to ensure continuation of the mutual effort to provide for long-term protection and management of the Springs, and the run below them, as watercress darter habitat.

- 4.3 Protect other habitat - The habitat of additional populations of watercress darters should have the same long-term protection and management provisions as the original three known populations.
- 4.4 Protect recharge areas - Long-term arrangements should be made to protect the recharge areas and to avoid contamination of springs providing habitat for watercress darters. This task is dependent upon completion of Task 2.3.

C. Literature Cited

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PART III: IMPLEMENTATION SCHEDULE

Priorities in column one of the following implementation schedule are assigned as follows:

1. Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
2. Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.
3. Priority 3 - All other actions necessary to meet the recovery objective.

Key to Acronyms Used in Implementation Schedule

ADEM - Alabama Department of Environmental Management
ADCNR - Alabama Department of Conservation and Natural Resources
B'ham - City of Birmingham, Alabama
ES - Ecological Services
GSA - Geological Survey of Alabama
NWR - National Wildlife Refuge
RES - Research

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